5.1.2 Proposed Stream Assessment Protocols

(June 24 1999; DRAFT)

I. Goals

1. To collect enough information about a water body to meet the definition of sufficient and credible data. Due to limited resources, the Department is proposing to assess a stream via conducting one field visit. Therefore, a considerable amount of effort will be made during the field visit to coordinate with the Conservation Districts, land owners, etc. and to collect data that reflects water quality over time. For example, macroinvertebrate and algae community structure, habitat evaluations, sediment chemistry, and chlorophyll *a*, all may reflect both the conditions of a stream at the time of sampling and also provide a historical perspective (e.g., Macroinvertebrates can reflect water quality for up to one year prior to sampling). In addition, an attempt will be made to collect historical data (e.g., fishery data from Montana Department of Fish Wildlife & Parks (MDFWPs).

2. To make beneficial use support determinations with confidence. Data will be collected to evaluate biology (fish, macroinvertebrates or algae), chemistry (water column and sediment) and habitat characteristics (aquatic and riparian). In most cases, at least two of the three categories (biology, chemistry or habitat) will be required to show impairment in order for a water body to be considered not fully supporting beneficial uses.

II. Methods

1. **Location**

All sampling locations will be documented using GPS, legal description, site description and dated still photography. Each stream will be sampled near the mouth and near the headwaters. Streams will be sampled approximately once every 20 miles (or at stream reach transitions locations; e.g., changes across ecoregions or land use activities). A DEQ Stream Reach Assessment Form will be filled out for each stream reach.

2. Chemistry

A) **Water column grab sample:** Analyze for pH, conductivity, dissolved oxygen, temperature, common ions, nutrients and trace metals. **Rationale:** Need water column chemistry to detect impairment (e.g., exceeds water quality standards or reference condition), and to

characterize the stream (chemistry reflects hydrogeomorphology, geology, etc). Data will also be useful for stream classification purposes.

B) **Sediment composite grab samples**: Sample deposition areas (e.g., surface sediments from the downstream side of point bars; 0-2 cm). Sieve the sediment to a uniform particle size and determine organic matter content. Analyze sample for total recoverable trace metals (nitric acid digestion) using an ICP scan (use an atomic absorption furnace for low level analysis of Se, As, and Hg). Compare results to reference condition. **Rationale:** Metals may enter the water column only when high water occurs. Metals that enter the water column from runoff will often precipitate under aerobic conditions or with a change in pH. Therefore, sediment may reflect metal availability to aquatic life over a longer time frame than does a grab sample from the water column.

3. Physical/habitat

A) **Conduct a stream reach survey**: Conduct stream survey using a DEQ Stream Reach Survey Form (DEQ SOP Manual). The form provides a scoring system. Compare the score to reference condition. Document physical impact using dated still photography. Document location of impact using GPS, legal description and site description. **Rationale:** Method documents impact to the riparian habitat, stream channel, spawning gravels, etc. and provides a numeric score that can be compared to reference condition. DEQ will also estimate discharge and document Rosgen stream class, stream order, elevation, gradient, aspect, basin area, upstream length, drainage density and primary source of water (e.g., spring) for classification purposes and developing reference condition for future reference (use maps where appropriate). **Note:** Average riffle width and depth, and percent canopy should be recorded for the site where biological samples are collected.

B) **Optional Physical/habitat Data Collection** Conduct a pebble count, measure channel cross section, percent fines, bank full discharge and discharge (discharge should be estimated if it is not measured). Determine percent land use in the watershed via maps, aerial photographs, etc. (e.g., percent dryland agriculture, irrigation, road density, urban, etc.). Generate a GIS map with land use coverages.

4. Biological

A) **Algae and Macroinvertebrates**: Collect algae and macroinvertebrate following Montana DEQ sampling methods (1995 SOP Manual). Calculate index (e.g., for calculating a macroinvertebrates index the method will include cumulative scores of metrics that will include: taxa richness, percent dominance, percent mayflies, etc.). The index will be compared to reference condition. **Rationale**: Invertebrates and algae integrate impacts to water quality over time (e.g., toxins, sediment, nutrients, habitat, etc.).

B) **Chlorophyll *a*:** Collect chlorophyll *a* samples and calculate chlorophyll *a* /square meter. Compare to reference. **Rationale**: Excessive chlorophyll *a* indicates that algae is abundant (productivity; biomass). Algae are often more abundant in water bodies that have increased nutrient loading.

C) **Fisheries:** Gather fishery information from MDFWPs reports. **Rationale**: MDFWPs fishery reports provide information concerning impacts to fishery populations and habitat.